

	L #	Hits	Search Text	DBs	Time Stamp
1	L1	112	(cmp or chemical adj mechanical adj polishing) and pad adj wear and pad adj conditioning	US- PGPUB; USPAT; EPO; JPO; DERWEN T; IBM_TD B	2005/05/04 14:44
2	L2	1288	(pad adj condition or pad adj conditioning)	US- PGPUB; USPAT; EPO; JPO; DERWEN T; IBM_TD B	2005/05/04 14:44
3	L3	112	1 and 2	US- PGPUB; USPAT; EPO; JPO; DERWEN T; IBM_TD B	2005/05/04 14:44
4	L4	8	conditioning adj parameter and 3	US- PGPUB; USPAT; EPO; JPO; DERWEN T; IBM_TD B	2005/05/04 14:44

	L #	Hits	Search Text	DBs	Time Stamp
5	L5	4	(model or software or program or memory) and 4	US- PGPUB; USPAT; EPO; JPO; DERWEN T; IBM_TD B	2005/05/04 14:45
6	L7	5	6 and 1	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWEN T; IBM_TD B	2005/05/04 14:46
7	L8	1705	(451/5).CCLS.	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWEN T; IBM_TD B	2005/05/04 14:47
8	L9	5	1 and 8	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWEN T; IBM_TD B	2005/05/04 14:47

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9	L6	2149	(438/692).CCLS.	US- PGPUB; USPAT; USOCR; EPO; JPO; DERWEN T; IBM_TD B	2005/05/04 14:53

US-PAT-NO: 6245679

DOCUMENT-IDENTIFIER: US 6245679 B1

TITLE: Apparatus and methods for chemical-mechanical polishing
of semiconductor wafers

----- KWIC -----

TITLE - TI (1):

Apparatus and methods for chemical-mechanical polishing of
semiconductor
wafers

Brief Summary Text - BSTX (3):

The present invention relates to the chemical-mechanical polishing
of
semiconductor wafers.

Detailed Description Text - DETX (2):

The present invention is a result of the recognition that a
particle-containing slurry is not required for chemical-mechanical
polishing
activity. Instead, chemical-mechanical polishing activity in the
present
invention derives from the interaction of nanoasperities on the pad
surface
with the substrate in combination with a particle-free reactive
liquid
solution. This absence of particles enables the incorporation of a
number of
desirable features into the liquid delivery system, particularly
recirculation
to ensure stable performance, removal of waste products, and
filtration of
contaminant particles.

Detailed Description Text - DETX (4):

Asperity contact models for chemical-mechanical polishing have
been
described in Cook et al. (U.S. Pat. No. 5,489,233) and Yu et al.
(U.S. Pat.
No. 5,441,598). However, prior art has ascribed the role of
asperities as
merely vehicles for the delivery of slurry particles to the substrate
surface
and have dealt only with the use of microasperities and

macroasperities. This may arise in part from a lack of recognition of the criticality of the size ranges of asperities which occur on a pad surface. Conventional asperity contact models address asperities of sizes in the micron range and assume simple deformation to accommodate to the substrate surface. A key aspect to the present invention is a recognition of the criticality of yet smaller asperities in the interaction with the substrate in the event that they do not permanently deform during contact. These nanoasperities, of a size range equivalent to the size of slurry particles, are expected to form high local contact stresses in the substrate during the polishing process. By judicious choice of the hardness of the materials of construction, so as to avoid permanent plastic deformation of the nanoasperities, and by the use of chemically reactive liquid solutions during this contact, it is possible to effect contact-mediated reactions, which are analogous to those which occur during slurry particle contact, which result in material removal primarily in the zone of contact. This then gives rise to the same spatial selectivity as is observed during polishing with particle-containing slurries, but without the need for particles in the system. This will be made clear in the subsequent discussion and examples.

Detailed Description Text - DETX (36):

Another advantage of the use of such reactive liquid solutions in the present invention is that it permits efficient recirculation and re-use. Because the liquid does not contain particulate matter, filtration of particulate contaminants resulting from pad wear, substrate polishing byproducts, or external contaminants is easily performed with conventional filtration equipment. This prevents possible scratching or other damage to the substrate being polished and makes substrate cleaning after polishing much

easier.

Claims Text - CLTX (9):

6. The apparatus according to claim 1 wherein said nanoasperities are regenerated periodically by pad conditioning.

Claims Text - CLTX (27):

20. The method according to claim 15 wherein said nanoasperities are regenerated periodically by pad conditioning.

Current US Original Classification - CCOR (1):

438/692